CNC-330 Series

►►► F8681 User's manual VER. 2.01

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1. Introduction

Thanks on your purchase of TAILY AUTOMATION CNC-330 series Micro controller

The CNC-330 is a high-performance micro controller, manufactured using high-quality component and the latest single chip microprocessor.

This manual will help in the installation, parameter setting, operate and daily maintenance of the CNC-330 controller. To guarantee safe installation and operation of the equipment, this manual should be read and understood before the actual installation begins.

※Some of software edition that controller used with different functions and wiring diagrams, please consult each software edition users manual for the details.

1.1. Model

◆ CNC-330 series offers two different models, depending on whether a close-loop driver is provided for various applications.

◆ AC Power input offers AC100V~120V and AC220V~240V, 50/60HZ.

Model	Winding spindle	Guiding traverse
CNC-330S	Drive 0.5HP DC motor in directly	Drive 2 phase 2.0A step motor in directly
CNC-330E	External connect winding spindle motor driver	Drive 2 phase 2.0A step motor in directly or external connect guiding traverse motor driver

1.2. Software edition

◆ F8681 Edition is design for linear winding machine, it controls a winding spindle motor and a guiding traverse step motor.

1.3. Caution

◆ The controller should be operated in an environment that is protected from moisture, corrosive gases, oil mist, and airborne dust, metallic particles.

◆ The controller should be operated free from magnetic noise, if not, use a noise filter to minimize of electromagnetic interference.

◆ Normally operate under 5℃~40℃ environment, do not block the intake/exhaust ports of the controller. Otherwise, a fault may occur.

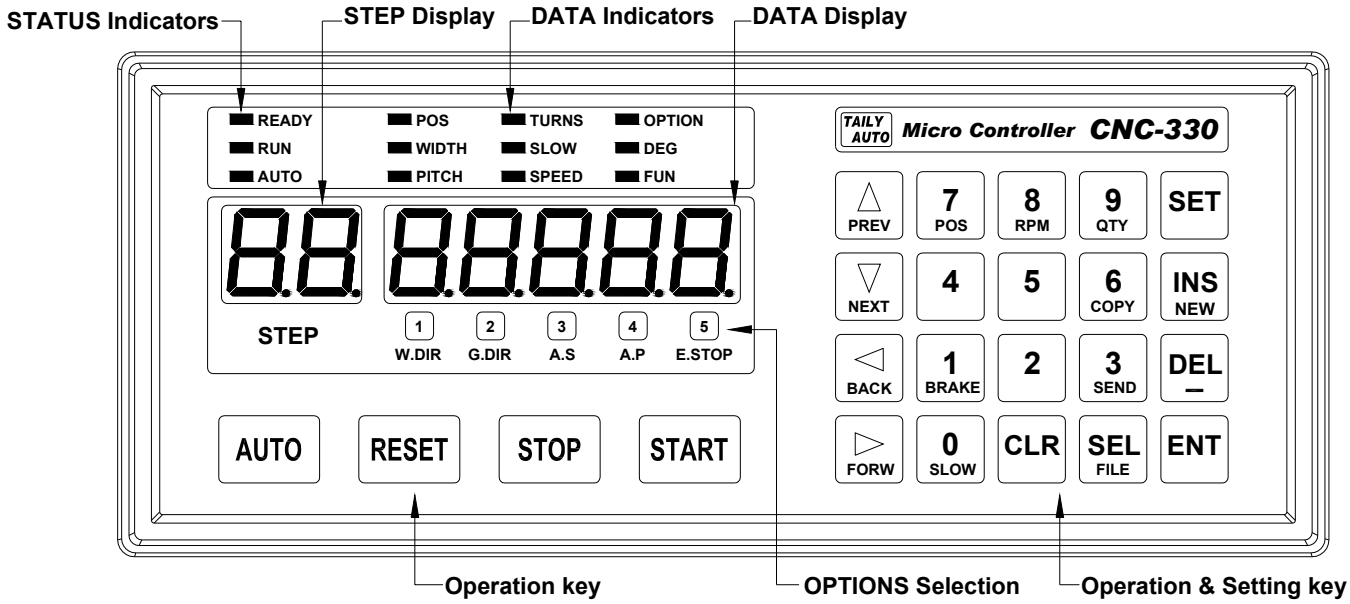
◆ Do not connect or disconnect connectors while power is applied to the controller.

◆ Make sure all the connectors are connected to the correct position before turn on the power.

◆ Make sure that the power source supplies the correct voltage and is capable of supplying the required current to the controllers.

◆ Make sure that the machine and controller are properly grounded.

2. Control panel description



◆ Status indicators：Indicates the operation status.

Indicator	On	Off	Flash
READY	Ready	Run/Edit	Pause
RUN	Run	Ready/Edit	
AUTO	Automatic mode	Manual mode	Data linking

◆ Data indicators：Indicates the data items at data display

Indicator (on)	Edit mode	Operation mode
POS	Starting position of guiding traverse	Position
WIDTH	Separating region of guiding traverse	
PITCH	Separating pitch	
TURNS	Total number of turns	Turns
SLOW	Number of turns to be winding at low speed before finish	
SPEED	Rotating speed of winding spindle	RPM(speed)
OPTION	Running Options： Winding direction、Guiding direction、 Auto starting、Auto positioning、Edge stop	
DEG	No function	
FUN	I/O Function	
(All Indicators off)		Production quantity

◆ STEP display：Displays STEP number, function code, item number.

◆ DATA display：Displays file name, winding data, position, turns, RPM(speed), quantity.

◆ Options selection：Indicate numerical key for options select.

3. Configuration setting & adjustment

3.1. Configuration setting

When supplied the power to CNC-330 for the first time after finish installation, the configuration set is necessary to insure CNC-330 is meet various winding machines specification request.
In READY mode, press〔SET〕〔SEL〕〔0〕to invokes this function, STEP Display shows item number[0.1.], DATA display shows setting value [XXXX], If no change is necessary, press〔ENT〕going to next item, or press〔－〕, then the parameter can be modified by pressing numerical key followed by〔ENT〕, There are 9 items can be set in this function, press〔SET〕again to finish this function.

◆ In this function press〔▲、▼〕to select item number, press〔CLR〕to clear setting value.

◆ When item number [0.2.],[0.3.],[.0.5.] setting value as [0] means without that function.

〔SET〕〔SEL〕〔0〕Configuration setting			
Item	Function	Setting range	Description
0.1.	Station number	1~9999	This station number used to identify the station when using RS-485 communication function, (Initial value as 1).
0.2.	Password	0000~9999	If password has been set, when press〔SET〕or〔SEL〕keys, the controller will request to key-in four digits of password, if passed, you can edit the setting data according normal procedure until turn off power or press〔RESET〕, if not, you can not edit any setting data, (initial value as 0000).
0.3.	Travel limit	0~99999.	Guiding traverse maximum travel length, When guiding traverse moves exceed this position, will stop immediately and the display shows error massage, then reset and get into ready mode, (Initial value as 0).
0.4.	Moving increment	0.01~99.99	Guiding traverse moving increment. This value is calculated according to the specification of winding machines, (Initial value as 2.00). ※The calculation method please consult the technical manual.
0.5.	limited winding speed	0~99999	The controller uses this value to calculate with [PITCH], and then automatically limited winding speeds to insure the winding spindles are synchronization with guiding traverse. (Initial value as 0).
0.6.	Braking time	0.0~9.9	To set the holding times for brake, (Initial value as 0.3).
0.7.	Moving speed	0~99	The speed at which the guiding traverse moving to the starting position or returning to the home position, (Initial value as 30).
0.8.	Control mode	0/1	CNC-330E offers two modes to controls winding spindle motor driver. 0. RUN=Motion/stop, DIR=Forward/Reverse, (Initial value). 1. CW=Forward/Stop, CCW=Reverse/Stop.
0.9.	Zero point	0/1	0. Represents winding spindle without zero point, (Initial value). 1. Represents winding spindle with zero point.

◆ In READY mode, press〔SET〕〔SEL〕〔9〕〔ENT〕will restore configuration setting value as factory initial value.

4. Winding method description

4.1. Running mode

◆ Manual mode
If the status indicator [AUTO] not light, when finish a step the controller will stop and wait for 〔START〕signal to continue next step winding. Select by〔AUTO〕key.

◆ Automatic mode
If the status indicator [AUTO] is light, when finish a step, the controller will automatically get into next step and start winding without press〔START〕. Select by〔AUTO〕key.

◆ Continual mode
If [POS] of the step set as 99999, when start this step winding the [POS],[WIDTH] setting data won't be re-read, the values are same as the ones of the previous step, and the guiding traverse will continue guiding wires from the current position where the last step stopped, both the guiding direction and winding direction are not changed either.

4.2. Turns counting mode

◆ Absolute counting mode
Winding spindle shaft is capable of fixed-point stopping. Upon each restart, the turns counter will reset only the integer portion of the turn's to zero, with the decimal unchanged.
For example, for a previous number of 100.3 turns, when starting the next step, the counting will start with 0.3 to avoid accumulation of spindle shaft free play error from consecutive windings. This counting method may cause insufficient winding by one turn. Therefore, when starting from **0**.**9**, the spindle will turn to the **0**.**0** before it starts counting.

◆ Relative counting mode
This counting mode zeros the counter upon each restart, therefore it is easy to understand and will not cause insufficient winding.

4.3. Special Wire-guiding mode

◆ Interlace wire-guiding
If [WIDTH] of the step set as [0.0], during winding the guiding traverse will follow the guiding direction to process two pitch and regressing one pitch, cyclically until finish the step.

◆ Non wire-guiding
If [PITCH] of the step set as [0.0], the guiding traverse won't be move during winding.

4.4. How to set the turns accurately

◆ Preset method
Set [SLOW] to zero and set [TURNS] as the desired turns, then press〔START〕to start winding. When finished, obtain the actual number of turns and calculate the number of overshot turns. Go into edit mode and subtract the number of the overshot turns from the [TURNS] to obtain the required setting.

◆ High-Low speed method
This method uses a combination of [SPEED], [SLOW] and [Slow speed] to achieve the desired number of turns.
[Slow speed] should not be too high. The number of [SLOW] turns must be adequate to allow the spindle shaft to slow down to slow speed before reaching the total number of turns.

◆ Double-brake method
As the winding turns reaches the numbers of the [SLOW], brake for a short period first. After the winding shaft stops, continue winding at low speed. Therefore the numbers of the slow speed may be reduced and the efficiency of winding may be increased.

5. Files management

The CNC-330 has huge memory capacity, can store at most 330 program files, each program file has a file name [Pxxxxx], constitute by letter P and five numbers, scope from P00000 to P99999, total 100,000 combinations.
Before operating and editing, must specify a file to become the active file, then all operations and edit will regard this active file as the target, all un-selected files will retain their original contents and unmodified.

In READY mode, use the following functions to manage program files.
The〔filename〕on following functions can be entering by numerical keys or use〔▲、▼〕key to browsed files.

◆ Re-call the file：
Press〔SEL FILE〕〔filename〕〔ENT〕to re-call the file and specify it become the active file. (Only the active file can be edit and execute).

◆ Delete the file：
Press〔SEL FILE〕〔filename〕, then press〔DEL-〕make the filename flicker, at the moment press〔SET〕to abort delete process or press〔ENT〕to delete the file.(The active file can't be deleted).

◆ Add a new file：
Press〔SEL FILE〕〔INS NEW〕〔filename〕〔ENT〕to add a new file, and specify it become the active file.

◆ Copy the file：
Press〔SEL FILE〕〔SEL FILE〕to shone the decimal point of Data display, then press〔COPY〕and entering a new〔filename〕, at the moment press〔SET〕to abort copy process or press〔ENT〕to make a copy with the new filename and specify the new file become the active file.

◆ Clear the files content：
Press〔SEL FILE〕〔SEL FILE〕to shone the decimal point of Data display, then press〔CLR〕to flicker the filename, at the moment press〔SET〕to abort the clear process or press〔ENT〕to clear all setting data of the active file to zero and restored operation mode selections as the initial value.

◆ Error messages

Error code	Description
Err.F0	Can't find the file, please reconfirm the filename.
Err.F1	The active file can't be deleted.
Err.F2	The filename has existed, please use with another filename.

◆ Check memory space
In READY mode, press〔SET〕〔2〕, display shows the total number of files stored in the memory, then press〔ENT〕to shows the surplus memory space percentage, press〔ENT〕again to finish this function.

◆ Format memory space
In READY mode, press〔SET〕〔SEL FILE〕〔CLR〕〔ENT〕to format the memory space and also restored all parameters as the factory initial value.

※Must be careful in use format memory space function, avoid to delete all files.

6. Edit program file

6.1. Determine the operation mode for active file

Each program file provides 9 items operation mode selections, and all steps in the same program file would be operate according to the operation mode selections,

In READY mode, press〔SET〕〔5〕 to determine the operation mode, STEP Display shows item number[5.1.], DATA display shows setting value [XX], If no change is necessary, press〔ENT〕get into next item, or the parameter can be modified by pressing numerical key followed by〔ENT〕, There are 9 items can be set in this function, press〔SET〕again to finish this function.

◆ Each file has a separate operation mode selections, in this function only modified the operation mode of active file, all other files will retain their original selection and unmodified.

◆ Press〔▲、▼〕to scroll through different items, press〔CLR〕to clear setting value.

〔SET〕〔5〕 Operation mode selections			
Item	Function	Setting range	Description
5.1.	Slow speed	0~99	Determines the slow speed for winding spindle. (Initial value as 10).
5.2.	Acceleration times	0~99	Determines the acceleration time required for the winding spindle to ramp from slow speed to the normal speed. (Initial value as 15).
5.3.	Home position corrective	0~99	After completes this quantity of productions, returns the guiding traverse to its home position to corrective guiding position. (Initial value as 0), means without this function.
5.4.	Turns setting range	0= 0.0~9999.9, 1= 1~99999	Determine the turns setting range, (Initial value as 0)
5.5.	Edge slow	0= no, 1= yes	Reduce winding speed before the traverse reach to the two side edges of width, (Initial value as 0)
5.6.	Braking mode	0= no, 1= yes	Brake for a short period, once the winding turns attained to the specified slow turns, after the winding shaft stops then continue winding at slow speed, (Initial value as 1)
5.7.	Start signal effective mode	0= Level 1= Trigger	Determine the external START signal effective mode： 0= Level mode: The low level (ON) for START. The high level (OFF) for STOP. 1= Trigger mode: First trigger (ON→OFF) for START, Second trigger (ON→OFF) for STOP. (Initial value as 1).
5.8.	Turns counting mode	0= Absolute 1= Relative	Select the turns counting mode： 0= Absolute mode: The winding spindle with absolute zero point and directions convert compensation. 1= relative mode: The winding spindle without absolute zero point and directions convert compensation. (Initial value as 1).
5.9.	Waiting times setting range	0= .01~.99sec 1= 0.1~0.9 sec	Determine the waiting times setting range for [FUN] I/O function. 0= The timers setting range as 0.01~0.99 second. 1= The timers setting range as 0.1~9.9 second. (Initial value as 1).

6.2. Edit winding parameters

Each program file can accept 72 winding steps at most and each step with 8 items of parameter to be set.
In READY mode, press〔SET〕〔ENT〕, The STEP Display shows step number[1.], data indicator [POS] light, data display shows position setting value [XXXXX], the parameter can be modified by pressing numerical key followed by〔ENT〕, then the data indicators [WIDTH] light, data display shows width setting value [XXXXX] , follow this way to set totally 8 items parameter for each step, Press〔SET〕again to finish this function.

If the data display of step number [1.] shows [End], Indicate that the file is empty, have to insert a new step and then you can edit parameter for step [1.].

◆ Insert a new step：During editing, press〔INS〕to add a step into current position and shift the original steps backward one after another.

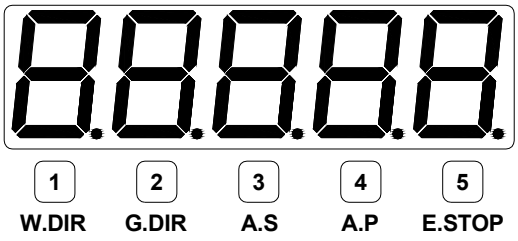
◆ Delete current step：During editing, press〔DEL〕to delete current step, the display flicker and shows [－dEL－]，at the moment press〔SET〕to cancel the procedure or press〔ENT〕to delete current step，And shift the followed steps forward one after another.

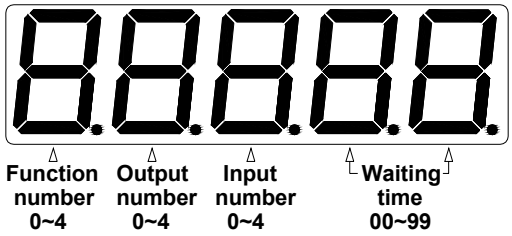
◆ During editing the following key functions are available：

〔SET〕〔ENT〕Edit winding parameters	
Key	Function
〔▲ PREV〕	Return to the previous step
〔▼ NEXT〕	Go forward to the next step
〔◄ BACK〕	Guiding traverse moving backward
〔► FORW〕	Guiding traverse moving forward
〔SEL〕	Scroll through 9 items of parameter
〔CLR〕	Clear the parameter to zero
〔0~9〕	Entering winding parameters
〔INS〕	Insert a new step
〔DEL〕〔ENT〕	Delete current step
〔ENT〕	Store the setting data into memory
〔SET〕	Finish edit
〔RESET〕	To abort edit and excuse reset process

◆ Press 〔◄ BACK〕or〔► FORW〕keys momentarily moves Guiding traverse in increments. Press and hold down of these keys to moves Guiding traverse quickly.

◆ Winding parameters：

<table>
<tr><th>Item</th><th>Setting range</th><th>Description</th></tr>
<tr><td>POS</td><td>0~999.99</td><td>Starting position of guiding traverse；Can also setting by press〔◄〕〔►〕keys.</td></tr>
<tr><td>WIDTH</td><td>0~999.99</td><td>Separating region of guiding traverse；Can also setting by press〔◄〕〔►〕keys.</td></tr>
<tr><td>PITCH</td><td>0~9.999</td><td>Separating pitch.</td></tr>
<tr><td>TURNS</td><td>0~99999</td><td>Total number of turns to be wound.</td></tr>
<tr><td>SLOW</td><td>0~999.9</td><td>Number of turns to be winding at low speed before finish.</td></tr>
<tr><td>SPEED</td><td>0~99</td><td>Rotating speed of winding spindle.</td></tr>
<tr><td rowspan="2">OPTION</td><td rowspan="2">0.0.0.0.0.
1.1.1.1.1.</td><td>Select running options for current step：
Press each options corresponding numerical key(shows below the digit) to toggle between 0 and 1.</td><td> 
</td></tr>
<tr><td colspan="2">W.DIR：Winding spindle rotate direction. 0= CCW, 1= CW.
G.DIR：Guiding traverse moving direction. 0= Backward, 1= Forward.
A.S：With auto starting function. 0= No, 1= Yes.
A.P：With auto positioning function. 0=No, 1= Yes.
E.STOP：With edge(layer) stop function. 0=No, 1= Yes.</td></tr>
<tr><td>DEG</td><td></td><td colspan="2">No function</td></tr>
<tr><td rowspan="2">FUN</td><td rowspan="2">0.0.0.0.0.
4.4.4.9.9.</td><td>Define I/O function for current step：

The action process as follow
Output ON→Detecting for input ON→
Timer count down→Output OFF→Next sequence.</td><td> 
</td></tr>
<tr><td colspan="2">Function number: Determine the I/O functions execution sequence :
<table>
<tr><th>Function number</th><th>Execution sequence</th></tr>
<tr><td>0</td><td>Without I/O function</td></tr>
<tr><td>1</td><td>Start → I/O function → Normal speed winding → Slow speed winding → Stop → Next step</td></tr>
<tr><td>2</td><td>Start → Normal speed winding → Slow speed winding → Stop → Next step
Start → I/O function → Next step</td></tr>
<tr><td>3</td><td>Start → Normal speed winding → Slow speed winding → Stop → Next step
Start → I/O function → Next step</td></tr>
<tr><td>4</td><td>Start → Normal speed winding → Slow speed winding → Stop → I/O function → Next step</td></tr>
</table>
Output number: Determine the active output number:
0=No function, 1=OP1, 2=OP2, 3=OP3, 4=OP4.
Input number: Determine the input number to be detected:
0=No function, 1=IP1, 2=IP2, 3=IP3, 4=IP4.
Waiting time: Determine the waiting time, 0.00~9.99 or 0.0~9.9 second.
Setting range is determined by〔SET〕〔5〕Operation mode selections.</td></tr>
</table>

7. Winding operation

Each time when supplying the power to the CNC-330, Have to press 〔RESET〕to do the reset process once and then you can start to running.

◆ Function keys for operation.

Key	Ready and Pause mode	Running mode
〔START〕	Start	Pause
〔STOP〕		Pause
〔RESET〕	Stop current process and do reset process	
〔AUTO〕	Toggle the operation mode between auto and manual	
〔SET〕	Get into edit mode	
〔SEL〕	To invokes file management function	
〔▲〕	Return to the previous step	
〔▼〕	Go forward to the next step	
〔0 Slow〕		Toggle the winding speed between normal and slow.
〔1 Brake〕	Toggle the brake between lock and unlock.	
〔7 POS〕	Toggle the data display to shows between guiding position and winding turns.	
〔8 RPM〕	Toggle the data display to shows between winding speed and winding turns.	
〔9 QTY〕	Toggle the data display to shows between production counter and winding turns.	

7.1. Production quantity management

Each time the winding process goes from the step [1.] to the [End], the production counter will automatically increase by one.

◆ Preset production quantity：
In READY and PAUSE mode, press〔SET〕〔9 QTY〕〔XXXXX〕〔ENT〕to preset production quantity, when finished a production, if the production quantity is achieved or exceed the preset value, the data display will flicker and shows production quantity and the buzzer alert for 2 second. [Setting range 0~99999].

◆ Decrease production quantity：
In READY and PAUSE mode, press〔9 QTY〕to make display shows production quantity, then press〔DEL－〕and holding down for two seconds, the production quantity will decrease by one.

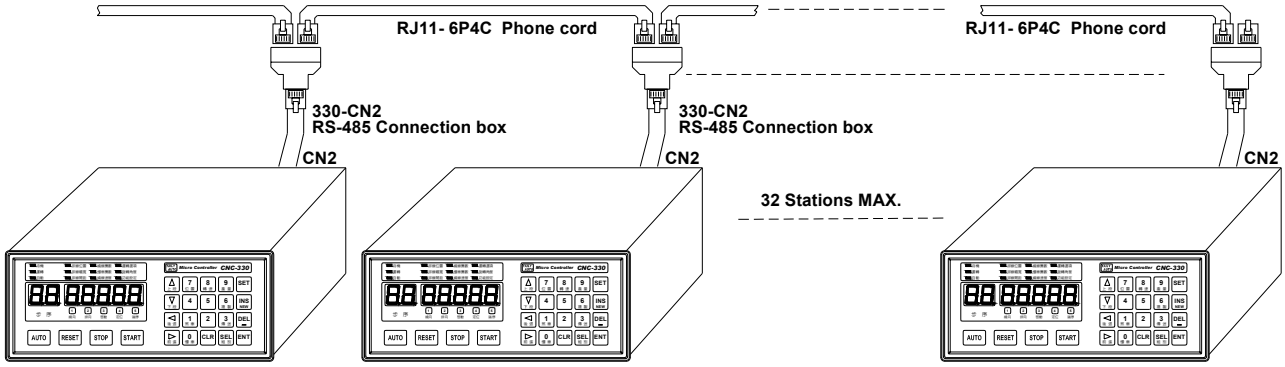
◆ Reset production counter：
In READY and PAUSE mode, press〔9 QTY〕to make display shows production quantity, then press〔CLR〕and holding down for two seconds, it will reset the production quantity to zero.

7.2. Additional functions

Key	Function	Description
〔SET〕〔START〕	Winding spindle test	Press〔START〕to starts winding spindle motor, press〔STOP〕to stop it, or press〔BRAKE〕to test the brake function. Press〔SET〕to finish this function.
〔SET〕〔STOP〕	Display test	Press〔ENT〕continuously, to checking the display and Indicator, segment by segment. Press〔SET〕to finish this function.
〔SET〕〔▲〕	I/O test	Press numerical key 〔1~4〕to switch each output ON/OFF. The data display shows each INPUT status.
〔SET〕〔▼〕	Key pad test	The step display shows AC power frequency. Press any key, the data display shows corresponding key code. Press〔SET〕twice to finish this function.
〔SET〕〔1〕	Check program edition	The data display shows [TAILY] first, then shows software edition [F XXXX]. Press〔SET〕to finish this function.

8. Data transmit

The CNC-330 with a RS-485 serial communication interface, can be used to sending the winding data to the others station, the wiring diagrams as below.



In READY mode press following keys combination, its will sending the setting data to the specify station.

〔SET〕〔3 SEND〕〔0〕〔XXXX〕〔ENT〕：Sends configuration data to the specify station.

〔SET〕〔3 SEND〕〔1〕〔XXXX〕〔ENT〕：Sends active file to the specify station.

〔SET〕〔3 SEND〕〔2〕〔XXXX〕〔ENT〕：To reset the password of the specify station.

〔XXXX〕Represents target station number. If the target station number specify as〔9999〕, all stations on the same network will receive the data is being sent.

◆ Note：

1. We have not supply RJ11-6 P4C phone cords, please purchase it at electronics material store.
2. To ensure stable working and transmission condition, please do not connect over 32 sets of controllers in the same network,
3. Make sure that all controllers are properly grounded.

9. MAINTAIN AND TROUBLESHOOTING

9.1. Periodically maintain

◆Periodically clean up the controller inner accumulate dust and dopants.

◆Periodically check the wire connection of the controller if have loose or bad contact.

◆The following parts must be maintained or changed periodically as list below.

◆For parts replacement, please contact your sales representative.

NO	Parts name	Life guideline
1	Winding spindles counting sensor CTS-03A	2 years
2	Guiding traverses home sensor HMS-01A	2 years
3	COOLING FAN (DC 12V 6cm)	10,000 hours
4	RELAY (on the 330-DVR driver board, it used to switching the winding direction)	100,000 times

9.2. Error message

When a fault occurs during operation, the DATA DISPLAY shows error massage, and stop current process then do reset process and back to the READY mode.

Error code	Description	Correctives action
Err-0	Memory failure.	Re entering the winding parameter. Send back the 330-CPU board for repair.
Err-1	The [POS] value sets over the limitation of travel limit.	Check the [POS] and [WIDTH] setting value. Check the [Travel limit] setting value.
Err-2	The guiding traverse moves over the limitation of travel limit.	Check the [POS] and [WIDTH] setting value. Check the [Travel limit] setting value.
Err-3	The guiding traverse moves exceed the home position.	Check the [POS] and [WIDTH] setting value. Check the [G.DIR] selection. Check or replace the home sensor (HMS-01A).
Err.L0	RS-485 LAN Communication failure.	Check the target station number is correct. Check the 330-CN2 wire connection.
Err.F0	Can't find the filename.	Please reconfirm the filename.
Err.F1	The active file can't be deleted.	
Err.F2	The filename has existed.	Please use with other filename.

9.3. To abort reset process

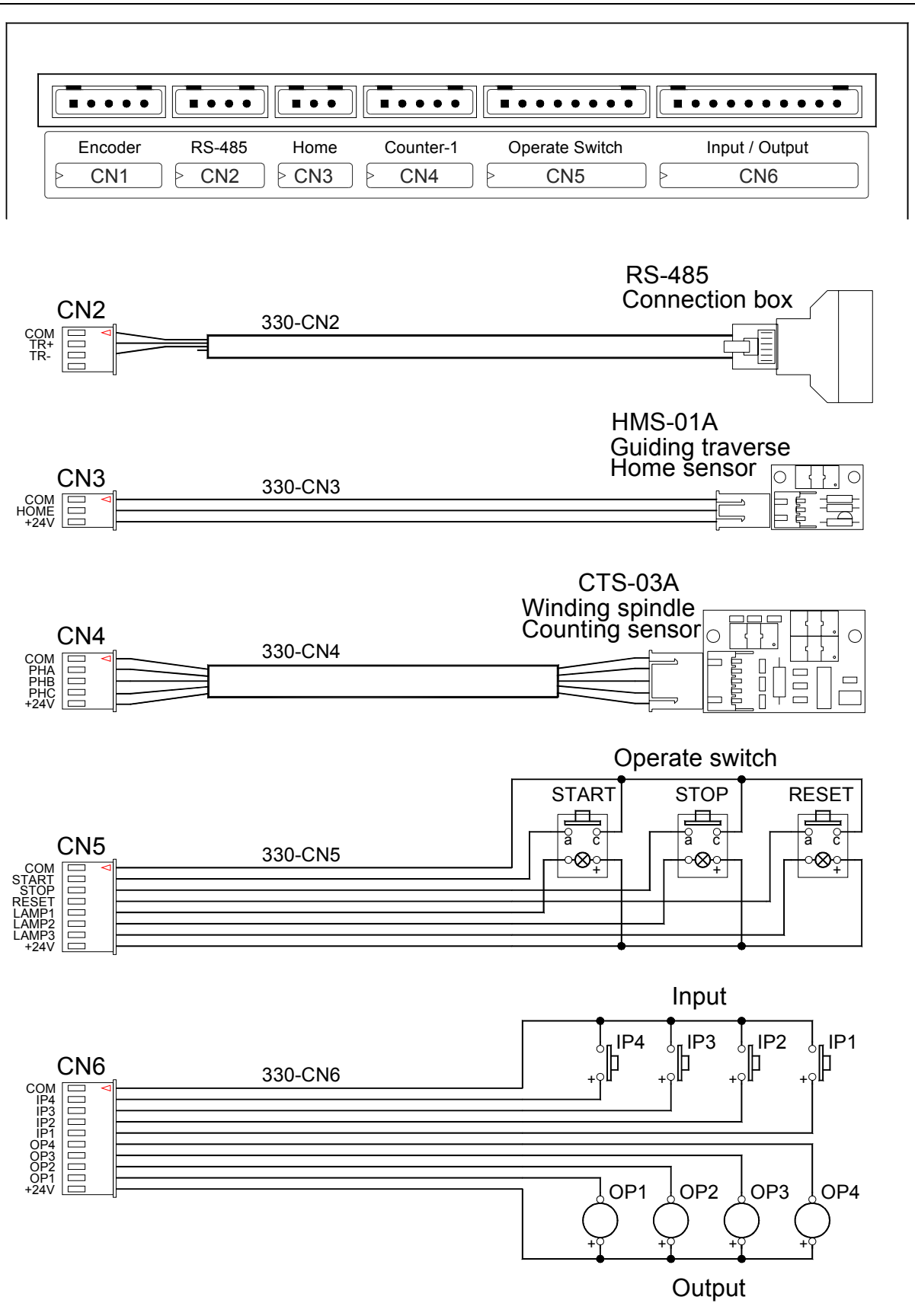
At boot and reset process, if because of unknown reason however engender the winding shaft and guiding traverse can't find out the original position and make the controller get into ready mode, can press〔STOP〕 key to abort reset process and make controller get into ready mode.

9.4. Reset password

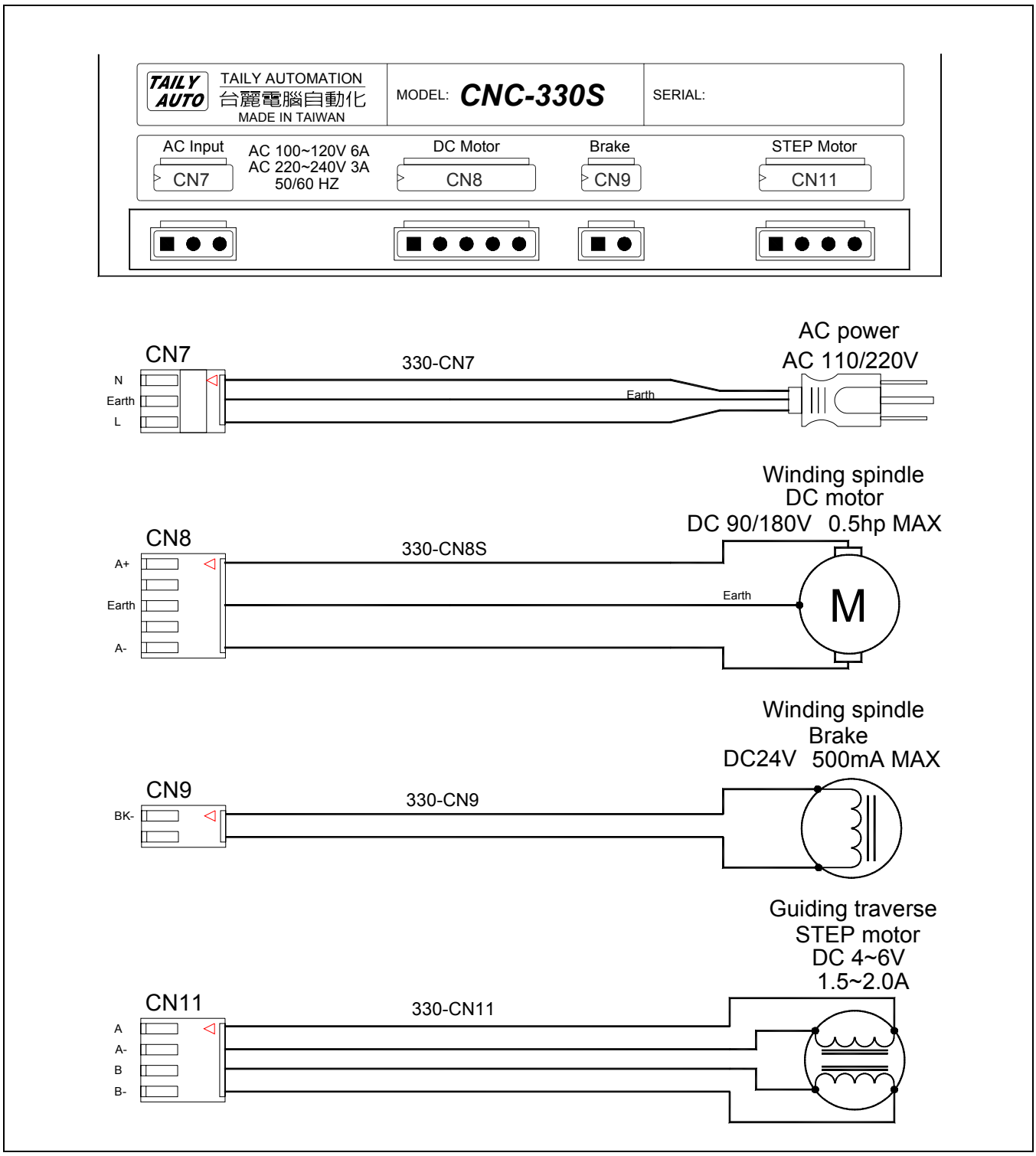
If forgot the password you have been set, you can press〔 DEL〕〔3〕〔3〕〔0〕〔1〕in sequence to reset the password as the initial value during the controller are requesting to entering password.

10. Wiring diagram

◆ CN2~CN6 Wiring diagram for CNC-330S / CNC-330E(CN1 is no function at F8681 edition)



◆ CN7~CN11 Wiring diagram for CNC-330S



◆ Interchange the wire leads A+ and A- of CN8, to reverse the direction of winding spindle rotation.

◆ Interchange the wire leads B and B- of CN11, to reverse the guiding traverse moving direction.

◆ CN7~CN11 Wiring diagram for CNC-330E

1. CNC-330E Provide three different winding spindle speed command output：
   a. H/L=high/low level, **b.** V-OUT=DC 0~10v, **c.** F-OUT=100~10000pps frequency output.
2. There are two modes to control winding spindle motor driver：(Select by Configuration setting).
   a. RUN=Motion/stop, DIR=Forward/Reverse **b.** CW=Forward/Stop, CCW=Reverse/Stop.
3. There are two ways to drives guiding traverse motor：
   a. CN11=Drive STEP motor in directly, **b.** CN10= Drive motor through external motor driver.